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THE NEEDS OF OUR NAVY

AS PERCEIVED BY THE FOREMOST BRITISH EXPERT

BY ARTHUR H. POLLEN

Mr. Daniels's programme is not an effort to produce a complete new navy. It makes addition to an existing navy. The ships commissioned and now in use will, nearly all of them, be essential portions of the navy it is designed to have in 1922 or 1923. It is an admission that the existing navy is deficient. Its promulgation is tantamount to saying, "We have not enough battleships, we have no battle cruisers, and we ought to have some. Our submarines, destroyers and scout cruisers are too meagre in numbers—too small and too weak in design." A new standard of naval strength is being set up. Certain obvious questions, then, arise for discussion. Are the additions now proposed to be made of the right sort? Are they being added in the right proportion? In other words, will the completed navy, with these new units, be a symmetrical, well-balanced, efficient force? Finally, if the answers to these two questions are generally affirmative—viz., that the right types are being added and in the right proportion—will this new, symmetrical, well-balanced force be adequate for America's needs?

It is the last question that is the most important. It is the only one of which the lay public can judge adequately. Landsmen, however close and intelligent the interest they take in naval affairs, can only in exceptional instances understand all the complicated matters that have to be decided before any new type of ship is finally resolved upon. A large number will be capable of judging—if they have followed the course of the present war closely—of the sort of proportion that should exist between the capital units in a fleet, and the light and subsidiary craft. But here again, to form a judgment of value, a close study of war and naval principle is indispensable. But whether the new navy will suffice for America's needs, this any educated man can, with the right data before him, answer. To some extent, of course, the answer depends upon the answers to the first and second questions. It is proposed to spend half a billion dollars on completing the naval force. If the result of carrying out the proposed scheme should be a top-heavy or a lop-sided force, if by spending the money on better types of ship, or good types in a better proportion, a perfectly balanced force will result; then, though the proposed navy might be inadequate, the more wisely selected force might suffice. But, without pausing to consider this alternative, let us push our inquiries as to the third question a little further.

The military power which a nation needs, either on land or on sea, is settled for it by its circumstances and its policy. If Great Britain lost command of the sea,—that is the certainty of being able to use it as the high road of its supplies, —the country holding an adverse command could impose its own terms of surrender on us in about six weeks' time. For practical purposes, we should be starving. We should be utterly defeated by hunger or the threat of hunger in a far shorter period than it would take to organize an invading expeditionary force, to land it, and conquer even the smallest portion of our territory. Any country wishing to defeat Great Britain in war need, therefore, only follow the perfectly simple prescription of building and maintaining a navy that much more powerful than ours as will suffice to insure the British Navy's defeat. The fall of England follows automatically. To every Englishman, then, the answer to the question, "How strong a navy does Great Britain need?" has, for some years, been comparatively simple and plain. We look round the world, we note the general grouping of the Powers, we calculate the naval strength of those likely to be opposed to us in war, and we provide a fleet adequate to engage the navies that might combine against us.

For example, at the beginning of 1914 we had of battleships and battle cruisers of the modern type, 21 in commission, 5 due for completion during the year, 5 building and 3 projected. Germany, Austria and Italy had of ships of the same class 18 built, 9 building and 4 projected. Our total, therefore, was 34 ships against the 31 of the Triple Alliance. Could we have counted upon France as our ally, we could have added the whole of her fleet to our total. The Russian fleet, being confined to the Black Sea and the Baltic, would not have assisted us against the Triple Alliance. But even without French assistance, we were in superior force to the whole of our possible enemies. Further, the conditions of the Triple Alliance being what they were, it had for some years been obvious that Italy would never join in a war of aggression waged by Germany and Austria against us, and it was quite certain that we should not force Italy to fight against us, by declaring an aggressive war against her partners. Hence our superiority was easily greater than 34 to 31. And as some thousands of miles separated the home headquarters of Austria and Germany, and as we were astride of the communications, our duty was really almost limited to maintaining an adequate balance against Germany.

Now this was a matter on which the opinion of the man in the street was as good as that of the sailor statesman. In spite of much confused thinking and wrong-headed argument, the man in the street fully realized that command of the sea, in the last resort, must be won and held by the side that possessed the largest number of the strongest naval units. Both in the number of our capital ships and in the power of their armaments, we have been compelled by public opinion to maintain a high percentage of superiority over Germany. At the outbreak of war our superiority in numbers was 40 per cent.; and comparing the striking power of these ships by the combined weights of a single broadside from each, our gunnery superiority was 60 per cent.

Has America in this matter any guide as unmistakable as was ours? Mr. Daniels's statement is quite silent on the subject. It is not a matter on which the foreigner gets very much enlightenment from such American writings, official or unofficial, as reach us on this side. And it is obviously not for him to suggest what the standard of American naval strength should be. And yet it looks like putting the cart before the horse to discuss the character and composition of the new navy without knowing first what it is for! The fleet America needs is the fleet that its circumstances and policies require. It is clear that there is no choice in the matter. Either American circumstances and policy determine the strength of the navy, or the strength of the navy will determine American circumstances and policy. Put into plain English the words "circumstance and policy" mean this. From what Powers do you expect trouble? Mr. Gardner and the General Board seem in this matter to take quite a definite and intelligible line. They say that the American navy should be equal to the most powerful which any other nation maintains. The most powerful navy is the British. It has maintained its standard of strength for purely defensive purposes. It has been built to prevent being altered, to Great Britain's disadvantage, the existing balance of power in the world. It stands today for the sanctity of international contract, for the liberty of small nations, for the right of Christendom to resist unscrupulous aggression and the public denial of justice, humanity and law. All these are fine things. The United States stands for them also. It would be to the world's benefit if they put themselves in a position to stand for them with effect. But, clearly, if it needs a navy up to the British standard to enable America to play Great Britain's *rôle* in this respect, then Mr. Daniels's programme is utterly inadequate.

The strength, then, of the navy that America requires must be dictated by the combined strength of the nations whose hostility to American policy and American ideals there is reason to fear. It is a question not for naval experts but for statesmen to settle. When it is settled, the equivalent of the navy required may, to a great extent, be determined by arithmetic. Relative battleship strength is the first point, though it is not the only one. When a list has been made of the Powers that may become enemy, add their battle fleets together, estimate what their strength is likely to be at any future date, and provide the battleship strength necessary for meeting it. With two final observations I shall leave this part of the subject. The General Board and Mr. Gardner want a navy equal to the strongest maintained by any single Power. If this is an intelligible, it is also a large and costly policy. But remember that it is not so costly as failure to have adequate naval strength when the time of trial comes. Secondly, if you want a *successful* naval war, provide a force at least 40 per cent. greater than that you are likely to meet. If you want an *exciting* naval war, provide one which is approximately equal. But a navy which is smaller in numbers and less in power than that of the probable opponent is demonstrably worse than useless. It is useless because there seems no *rôle* at all for an inferior fleet. It neither protects nor enables you to attack. And it is worse than useless, because to possess a great fleet which is not great enough to fight successfully is a waste of treasure and effort and men in time of peace, and a source of bitter humiliation in time of war.

Let us now pass to the second question. Does the new programme provide a well-balanced fighting fleet? To discuss this we must take something in the programme as a basis. And naturally we shall take the strength in capital ships, because, as we have seen, command of the sea ultimately depends upon these and upon no other form of naval force at all. Mr. Daniels proposes to build so that in 1922 or 1923 America will possess 27 battleships and 6 battle cruisers. What relation will the other fleet units bear to this force, judged first by the standard which the peace theory laid down as desirable, and next by that which war has shown to be vitally necessary? The other fleet units are cruisers and destroyers. Until recently cruisers have been of a score of heterogeneous types, ranging from 2,000 to 13,000 tons, with armaments running from 4-inch to 12-inch guns, and with speeds all the way from 19 to 30 knots. Expert analysis and criticism have long since shown that the armored cruiser is a bastard unit. It has neither the armament nor the protection of the battleship, nor the speed of the scout and the commerce protector. The career of von Spee does, it is true, show that a squadron of such ships in the Eastern Pacific, disposing of a broadside of twelve 8-inch guns, could detach from the main seat of war anything from four to six times its strength until that squadron was immobilized or destroyed. But this is the only instance in which the armored cruiser has influenced the war at all. No doubt every armored cruiser that Great Britain possesses has been commissioned and in use since the war began. But they have been little other than more costly and slower substitutes for the faster, lighter, and cheaper cruisers that do not exist.

In naval war there are two purposes which cruising ships fulfill. The first, which makes the greater demand upon their numbers and activities, is the protection of trade. But the second is hardly less important. The capacity to use fleets of capital ships with effect depends not entirely but very largely upon the degree to which the admiral is served with cruising ships. If there is one thing plainly written in the history of naval war it is that scarcely ever have the admirals using the capital ship squadrons had a sufficiency of lighter craft at their disposal. In our two great wars against Revolutionary France and Napoleon our admirals sent up an unending complaint of the deficiency of their equipments in this respect. Yet in 1793 we had 135 cruisers commissioned in the Royal Navy. By 1809 this number had risen to 684. In 1796 we had brought our ships of the line to over 100; we already had seven cruisers to each two ships of the line. But in 1809 the ships of the line had hardly increased at all. The proportion of cruisers then to capital ships had practically doubled. In the year of Trafalgar they were five to one. But so great were the demands of trade for protection that neither Nelson nor any of the fleet commanders had at any stage of the campaign a sufficiency of frigates.

What was the British Navy's standard of cruising strength before the war began? In 1914, as we have seen, the British Navy had, built and building, 34 capital ships of the first class. Again, built and building, we had 38 armored cruisers and 89 light cruisers; or 127 cruisers in all. Of these, 46 possessed a speed of between 19 and 21 knots; 32 had a speed of between 22 and 23 knots; 33 had a speed of from 24 to 26 knots; and 16—most of which were still building—had a designed speed of 30 knots. Thus the total ratio of cruisers to capital ships was a little less than four to one. Of slow and more powerful cruisers the ratio was about one and a half to one; of cruisers from two to three knots faster than the battleships, about one to one; of cruisers from three to five knots faster than the battleships, about the same; and of cruisers about 50 per cent faster than battleships, about one to two.

In a modern fleet the destroyers discharge, like cruisers, several functions. They can be used for scouting, for commerce protection, especially against submarines, for protection of battle fleets from submarines, and for the delivery of torpedo attacks on enemy fleets in action. Built and building in 1914, we had 240 destroyers, or 7 to every capital ship. Thus, of all light craft put together, it is fairly accurate to say that for every 2 battleships we had 3 slow cruisers; 2 cruisers 10 per cent. faster; 2 cruisers 25 per cent. faster; one 50 per cent. faster, and 14 destroyers. Of the destroyers, roughly one and a half were capable of a speed of $25\frac{1}{2}$ to 27 knots, and the other half of a speed of 30 to 35 knots. How does Mr. Daniels's proposition of light craft to capital ships compare with this, which was Great Britain's peace standard?

The completed American Navy is to consist of 27 battleships, 6 battle cruisers, making 33 capital ships; 10 armored cruisers, 13 scout cruisers, 5 first-class cruisers, 3 second-class cruisers, and 10 third-class cruisers—a total of 41 cruising craft. Of destroyers there will be 108. The proportion of cruisers to capital ships, then, instead of coming up to the British standard of approximately 4 to 1, would actually be less than 1.25 to 1, and the proportion of destroyers to battleships, instead of being 7 to 1, would be a little less than $3\frac{1}{2}$ to 1.

If, then, the British peace standard was right, there will be a deficiency in the American Navy of nearly 120 cruisers and 100 destroyers. It may be quite truly objected that more than one-third of the British cruisers were either of obsolete types, like the armored cruisers, or of a speed which modern conditions make almost useless—that is, of less than 22 knots. It can be urged with justice that 20 fast cruisers would probably more than do the work of these 46 slow ones. But if this is said, then I must object that 28 of the 41 American cruisers would be in exactly the same case. And if these are obsolete already, they will not be less *démodés* five or six or seven years hence. Of the British cruisers, after all, 32 had a speed of from 22 to 23 knots, and 33 a speed of from 24 to 26 knots; 16 were designed for 30 knots. So far as I know, against these 81 cruisers of over 22 knots, America in 1925 will possess only 13.

But a comparison of the proposed American Navy with what was the peace standard of the British Navy does not state the case against Mr. Daniels's programme as strongly as it can be stated. All instructed naval opinion in England had for many years proclaimed that the ratio of fast light craft to battleships had been allowed to sink to dangerously low proportions. The sixteen 30-knot cruisers laid down only just before the war were a belated effort to conciliate this very damaging criticism. The extent to which we have suffered in the war from the lack of cruisers of this type can be judged from the following facts: From the outbreak of war to the present moment, so far as is known, not a single German cruiser has left its home ports and joined any squadron abroad, or been able to put itself upon the high seas. At the outbreak of war the *Leipzig, Emden* and *Nürnberg* were with von Spee in the Eastern Pacific; the *Dresden* and *Karlsruhe* were in the neighborhood of Mexico or the West Indies; the *Bremen* was in the Atlantic; the *Königsberg* was in the Indian Ocean. A few armed merchantmen were ready for work on the South American trade routes. Of the cruisers the *Dresden* and two armed merchantmen prolonged their existence by taking refuge in the tangled waterways just above Cape Horn. The first was destroyed. The armed merchantmen interned themselves. The *Karlsruhe* ended mysteriously. The *Königsberg* was driven up the Rufigi. Only the *Emden, Leipzig, Nürnberg, Dresden* and *Cap Trafalgar* were brought to action. Between them they inflicted damage on British shipping by direct capture of not less than £6,000,000 sterling. Had von Spee detached the *Leipzig, Nürnberg* and *Dresden* from his squadron the first moment he sighted the battle cruisers in Port Stanley, Heaven knows how long it would have taken before all the three of them were immobilized or sunk, or what damage they might still have done. And the damage they did is not to be measured only by the ships and cargoes they captured and destroyed. The cost of underwriting, and hence the cost of freights from South America to Europe, were gravely affected. The total cost of these cruisers to us can hardly be placed at a lower figure than £8,000,000 sterling. It is a sum that might have been reduced by half or more. Four million pounds would have given us a round dozen of cruisers better armed and faster than any of these. They might have ended the *Karlsruhe* and *Emden* before their depredations had gone far. And these would have been of incalculable war value apart from completing this particular job. It is only a single instance that goes to prove that the ratio of non-battleship strength to battleship strength, instead of being too high, was undoubtedly too low in the British Navy.

The deficiency of fast light craft became still more evident when the rude experience of war wakened our Admiralty up to the fact that it had entirely failed to provide adequate protection against submarines. Before the submarine attack on trade began, the objectives of these much discussed and little understood units of naval force were the ships of the Royal Navy and the transports plying between England and France. No unit of the first importance of the Royal Navy was successfully attacked by submarines at all. And almost no unit of any importance amongst the transports was hit or damaged. Of the warships that were lost, hardly one fell in conditions that would have seemed permissible had the capacity of the submarine to attack fleets been adequately analyzed before war began. When the three *Cressys,* the *Hermes, Hawke* and *Niger* had been sunk, the principles of defense came to be better understood. In effect, our 240 destroyers proved adequate for the maintenance of the requisite flotillas for dealing with the German fleet if it came out, and for the protection of the fleet and the transports. But when the attack on trade began there was no margin available. I cannot then doubt, supposing that we lumped all the cruisers and destroyers together, and say that we possessed at the beginning of the war a proportion of about 11 other craft to each battleship, that that proportion was far too low. It was too low because so large a number of the units had not the speed requisite for modern conditions. But apart altogether from this, had the provision been 50 per cent. higher, it would not have been excessive. The saving in the protection of trade might more than have equaled the outlay necessary to provide it.

As a criticism, then, of Mr. Daniels's programme, one is tempted to suggest that its weakest point is the inadequacy of its light craft, and certain special conditions arising out of the naval situation in America seem to lend additional point to this criticism. The naval enemies of Great Britain could both of them be cooped up. Within one hour of the declaration of war the German Navy was completely blocked in, and the Austrian Navy no less. But if America finds herself in a naval war it will be quite impossible for her to slam the door of the fleets hostile to her with the promptitude and completeness with which these two doors were slammed by us. Her enemies will be able to put everything afloat to sea before she can turn a screw to stop them. The only difference between our case and yours is that the British sea trade is much greater. But that, after all, touches only part of the case. And it should be added that the United States has a coast line almost incalculably greater than ours, and she may have to fight on two fronts and not on one only. It would seem, then, if the ratio of light craft to battleships was too low at 11 to 1 in the British Navy, and should have been 15 to 1, the ratio of America would certainly not be much too high at the latter figure, and should certainly not fall short of the former.

And now to the first of my questions: Is Mr. Daniels proposing to add the right kind of units to the American Navy? This is rather difficult to discuss without going into a series of technical matters which perhaps the majority of readers of The North American Review might find tedious. But certain things leap to the eye. It is noticeable, for instance, that the cost of the unit battleship is to be $18,800,000. The cost of the *Iron Duke,* the flagship of the Grand fleet, was under $10,000,000; the cost of our battle cruisers of contemporary design, that is the *Lion* and *Queen Mary,* was approximately equal to that of the *Iron Duke.* The American battle cruisers, I observe, are to cost $17,500,000, or $1,300,000 less than the dreadnoughts. When all allowance is made for the increased cost of material, these seem to be prodigious figures, and one supposes that this great increase in cost must reflect some great increase in size, protection, armament and speed. It has been stated here that the Bureau of Construction and Repair does not propose to adopt a bigger gun. It seems incredible that a greater number of guns should be put into the new battleships than is already put into the latest class which America is building. Where, then, is the extra money going? Greater speed, of course, is costly, and greater armor protection still more costly, because it adds to the size and strength of hull and increases the power necessary to attain to any given speed. Do the events of the war make any case for increasing the speed and protection of battleships? Surely not. There has been no fleet engagement, and the only time that dreadnoughts met, viz., when Sir David Beatty chased the German battle cruisers across the North Sea, the circumstances were in no way parallel to those of previous fleet actions, nor do they suggest anything that is likely to recur. Undoubtedly they advertised speed, but they threw little light on the question of armor. The naval constructor, then, must be in a difficulty. No one knows from experience whether higher speeds will prove of value when both sides want to fight—whether larger guns are worth the sacrifices they extort, whether thicker armor is a necessity. All one can say with confidence is that so far very little new light has been thrown on the principles which have governed battleship construction to the present time.

In 1913 the British Admiralty decided to arm our new capital ships with the 15-inch guns instead of the 13.5. It was an advance in projectile weight from 1,400 pounds to approximately 2,000. It involved a diminution in the number of guns carried. What the arguments were on which this change was brought about the British public has not been told. The only information it has on this subject is exceedingly disquieting. It is that the experts disagreed and that it fell to Mr. Churchill to decide this knotty point himself. It was he, and not the seamen, who had settled the matter! In his farewell speech in the House of Commons he informed us of this staggering fact, as if the rightness of the decision could be taken for granted. He entirely failed to perceive that the fact that it was a lay decision was almost conclusive as to its being wrong.

From almost every point of view it seems bad policy to diminish the number of guns that a capital ship carries. There is only one argument to counterbalance the objection. The heavier the shell, the flatter the trajectory and the greater the constancy or accuracy of the gun at great ranges. The standard of exactness in knowledge of range is determined by the flatness of trajectory. If to hit with a 6-inch gun at 12,000 yards you must know the range within 40 yards, to hit with a 15-inch gun you need not know it more nearly than to 150 or 200 yards. In other words, you may be allowed an error four or five times as great and yet hit. But more than this, the 15-inch gun will probably make three times as high a proportion of hits to rounds fired as the smaller weapon at this range. If the 15-inch gun was preferred on the ground that a higher standard of marksmanship could more easily be obtained with it than with the 13.5, then there was a good military reason for preferring it. But there would have to be something in the ease of obtaining the higher standard of marksmanship to compensate for the loss of volume of fire.

Most landsmen—and some seamen—judge of naval weapons not by what they *can do* in practice but by what *they are* in theory. They are more impressed by the torpedo than by the gun, because a torpedo strikes a ship under water, while the gun strikes it above water, and they know that the damage inflicted by the smallest torpedo may be much greater than that effected by the largest shell. And as between different sizes of guns they conclude that the bigger the shell and the greater the range to which it carries, the more effective the gun must be. They ignore the only thing worth remembering. It is that guns are made to *hit* with. Unless a larger gun promises more hits it is not worth changing.

There is, then, so far as the public knows, no reason for supposing that if American seamen stick to the 14-inch rifle they are making any mistake in so doing. It is possible that the 15-inch would give better results at ranges from 16,000 to 19,000 yards. But surely inside those ranges the difference would not be material. Probably the cost in the increase of capital ships is mostly due to an increase in speed. High speed is of undoubted value. But it is of less value if it is in a few ships of the fleet and not in all. It might not be worth raising the price to obtain only this. But the choice in speed, like the choice in the size of guns, is emphatically a matter for experts to decide. It will be dangerous if public opinion pushes them to larger and costlier ships, if this leads to a diminution of numbers in seeking a higher standard of individual power.

The most interesting features in the American programme are the battle-cruisers, the 10 scout cruisers, and the submarines. With regard to the type of battle cruisers what has been said in the matter of battleships applies still more strongly here. If you are likely to engage an enemy that possesses this form of craft, it is necessary for you to possess them too. But the ships must be individually faster and more powerful. If they are not, you may be just as well without them. The battle cruiser really is a luxury of the rich Power. Germany's battle cruisers have been perfectly useless to her. They made a certain amount of sport for Sir David Beatty a year ago, but they have never, in the North Sea, attempted and have never achieved any military result of the least importance. The only battle cruiser that has done good service to Germany was the *Goeben,* that dodged the British squadrons in the Mediterranean and brought Turkey into the war, and she should have been sunk long before she reached the Dardanelles. The four left in home waters might just as well never have been built. Indeed, had Germany constructed five dreadnought battleships to take their place, the outlay would have been about the same—for over here the fast battle cruisers cost at first more than dreadnoughts—and she would be in a far better naval position. For the war opened with our having 22 dreadnoughts in commission, and had Germany preferred battleships to battle cruisers, she might have had 21. Her chances in a fleet action would have been much better if our superiority in capital ships had been represented solely by a single battleship and the four battle cruisers that were in home waters.

Of the proposed scout cruisers, what strikes one most—as in the case of battleships—is their enormous cost: $5,000,000 each! The latest British type of light cruiser, the *Arethusa* and *Calliope,* displace 3,800 and 3,520 tons each, according to the publications given out before the war. Their cost has not been published. But I should be surprised if either type exceeded $2,000,000. The weakness of these ships is their armament—three and two 6-inch guns and six 4-inch. The ideal light cruiser armament would appear to be five or six 6-inch guns. No gun that is any smaller gives sufficient results—as is shown by the fact that the German 4-inch shells never did any harm to those of our ships that have engaged them. But, on the other hand, it is bad policy to increase the weight and size of the ship unduly. Speed and high speed are of course badly wanted, but when it comes to $5,000,000 a ship it looks as if the new scout cruisers would be more like the armored cruisers of a former date—unduly fast, or unduly armed, or unduly armored. To do this is to fall into the error of sacrificing numbers to speed and strength. The cruiser is primarily a scout and commerce protector. If its strength and speed are adequate for meeting enemy cruisers, it is all that is needed. And for this a 6-inch gun should suffice. Surely it would be better economy in this particular to spend the money on larger numbers. For, as we have seen already, it is the numbers of fast craft that is the most conspicuous lack in the programme as it stands. As to destroyers we have no details, but here again speed, radius of action and armament are all vital factors.

The most questionable element in the American programme is the very large provision of submarines. Fifty fleet submarines and 85 coast submarines, which are to cost in all nearly $80,000,000, make a vast hole in the half billion that it is proposed to spend. As it is in many respects the most striking, so in another it is the most difficult item to criticise. The special circumstances of this war and the very extraordinary circumstances which preceded it, have given the submarine an entirely false importance in the public eye. Essentially the submarine is a variant of the destroyer. Once within attacking range of an enemy it has what the destroyer has not, the power of delivering a daylight attack, remaining itself almost unseen. But invisibility is not a new attribute. The torpedo boat and the destroyer possessed it at night. Their speed enabled them to deliver the equivalent of unseen attack in the dusk. Except that the submarine's invisibility is more complete, it is the destroyer's inferior. It has less speed, it is less strongly armed.

But its invisibility does give it a function new to naval war. It has the capacity to pass through waters which are absolutely commanded by surface ships—because it can pass them submerged and unseen. Fleets otherwise powerless to enter commanded waters can now enter them with this form of craft. Thus the German submarines have been at large to a limited extent in the English Channel, and with extraordinary freedom in the North Sea, in the Western Atlantic and in the Mediterranean. They have gone, in point of fact, where no German surface ship could have gone at all. British submarines similarly have penetrated the Sea of Marmora and the Baltic. The first and most striking fact about the submarine, then, is its capacity to enter into and operate in waters that are adversely commanded.

But once in those waters the power of the submarine is extraordinarily limited. Indeed, its capacity to enter those waters can also be limited. The use of nets, of mines and of patrols—especially when assisted by aircraft—these at any focal point which submarines coming or going must pass, can do much to obstruct their free passage. The narrower the waters, the easier their control by these means. And even in comparatively open waters great destruction can be and has been done by surface craft upon them.

But, apart altogether from the dangers to which the submarine is exposed, what is its value when it is at work in hostile waters? It has two weapons, the torpedo and the gun. It can carry but few torpedoes—few, that is, compared with the number of rounds of gun ammunition that it can stow away. The torpedo, too, is an uncertain weapon at the best of times, particularly uncertain when aimed while the submarine is submerged. Wherever it is possible, then, the captain of the submarine has done his work with his guns. But as a gunned ship the submarine is the weakest thing afloat. Hence its guns can be used only against unarmed craft. It dare not approach any armed ship on the surface at all. If it has to approach an armed ship submerged, its speed of approach is greatly limited. The highest submerged speed does not exceed the half-power speed of the slowest warship. Hence high speed and a high standard of vigilance in ships which are armed makes them altogether immune from submarine attack except in the rare cases when, by pure chance, their course takes them within the submarine's striking radius. It was thus, it is supposed, that the *Formidable* was destroyed on New Year's Day, 1915. It was thus that the *Lusitania* fell—if the fact that she was within a yard or two of the course she had taken every time she had ever crossed the Atlantic can be described as chance and not as folly. The point, however, is that if the ship is armed the submarine must keep submerged, and if it keeps submerged its maneuvering speed is low, its capacity to get within striking distance very limited, and its weapon very uncertain. If the ship it intends to strike is both at speed and accompanied by destroyers or fast craft, the area of danger to the submarine and the intensity of the vigilance are increased, and the danger from submarines becomes altogether negligible.

The success of the submarine against the merchantman is to be explained by the fact that merchantmen being unarmed, the submarine has been able to deal with them as any other armed surface ships would do. The speed of the modern big submarine is higher than that of any but a score or so of the fastest liners, and a single 12-pounder is quite sufficient armament to subdue a merchantman if the merchantman is unarmed itself. If submarine attacks on trading ships become recognized as legitimate by civilized nations, then all merchantmen will be armed, and their case will approximate that of the warship.

But the most remarkable failure of the submarine in this war is its incapacity to do the one thing which even those who thought least of its capacity took for granted. It has entirely failed in its function of coast defence. The German submarines have been unable to defend either the ports of France, the coast of Gallipoli, Salonika, Valona, or the coast of Egypt from the allied battleships and transports. The explanation is simple. It has not been able to interfere with the transport and disembarkation of troops because these operations have been carried out in waters superficially controlled by the fleet to which the transports belonged. What the submarine could do in defending a coast in waters superficially controlled by its own side will probably never be proved. These are not the conditions in which intending invaders send their armies across the sea. Had the Germans been mad enough to try to land a force in England, I have no doubt that British submarines, acting without any fear whatever of destroyers or other fast craft, could have accounted easily for every transport that got past our battleships, our cruisers and our destroyers. But I have, if it is permissible to say so, still less doubt that any transports would ever have got past!

The root of the matter seems to be this: If you command the seas with surface craft the *rôle* of the enemy submarine is limited to being a somewhat inefficient guerilla. It can waylay peaceful merchantmen, just as the highwaymen of old in England held up travelers, and " bad " men in America have occasionally held up trains. But it has not taken any such toll of British shipping as the privateers took in olden days, and, like the privateers, it has been absolutely incapable of interfering with military communications where the surface is efficiently commanded. In this matter the British submarines have entirely eclipsed the German. Both in the Sea of Marmora and in the Baltic, our successes against transports have often been greater in a single week than the German submarines' against our transports in the whole campaign.

A foolish and most unfortunate statement of the British Admiralty in January, 1915, had attributed to submarines an importance that they never possessed. It was said that the British fleet desisted from the attack on the Germans at the Dogger Bank because of the presence of under-water craft. I am persuaded that no British Admiral could ever have made this excuse—and survived. If enemy submarines are observed at sea, it will no doubt be necessary to avoid passing within range of them. But a suddenly discovered minefield or a well-planned torpedo attack from destroyers each would have exactly the same effect. It would impose upon the commander of a battleship squadron a sudden, and perhaps a large and violent, change of course. But it would be no excuse for flight. If such an excuse were admitted it would be tantamount to saying that submarines could sweep the sea!

What is the application of these considerations to the American programme? I suggest that the principles to bear in mind are these: The more certain you are of commanding the sea against your adversaries, the more useless submarines will be to you. If you command the seas you will not want them for coast defence. If you do not command the seas they will not defend your coasts. They will not help to win command of the sea. You will hardly want them for attacking the enemy's trade, for you are too far from the focal points of any enemy's trade to be able to maintain submarines upon them.

Take it for all in all, I suggest,—while Mr. Daniels's programme shows no sign of the idiotic absurdities about submarines that have been put forward on this side,—that, nevertheless, it has been influenced by the great effect the submarine has had on the public and professional imagination. And this leads me to my concluding point.

It is impossible to get any large change of policy carried in this country unless public opinion is instructed and educated in the issues and principles involved. The same conditions no doubt prevail in America, and may prevail to a still greater extent. But it must be remembered that the details of naval programmes are not fit matter to be settled by public acclamation. The scale of the programme is certainly so. The objects for which the navy is to be built are so, but the details manifestly are not. If the American statesmen and the American public can agree together as to the standard of strength that their navy ought to attain, there is only one sound way of insuring that that strength is attained and at the smallest sacrifice. It is to leave the details to be decided by the best expert opinion that your navy can produce. Remember that you want experts on a great many subjects. Remember also that to put yourselves into the hands of an individual expert is not the only way, and seldom the best way, to secure the best results. The general knowledge of a great service like the American Navy is more extensive, and its judgment is saner, than that of any single man, however gifted he may be. Remember, too, that the criticism of those who *use* the things that are provided is far more valuable than the suggestions of those that *make* them. The programme is quite silent as to expenditure on methods—and yet the methods of using weapons are of far vaster moment than the size or power or cost of the weapons themselves. The provision of a navy is certain to be bungled if it is not guided by the best strategical and tactical brains you have. And the strategical brains will be misled unless they have mastered tactics, and the study of tactics cannot begin until the art of using weapons has been brought to perfection.

If the occasion of a great naval programme were made the occasion for organizing a well-proportioned naval staff—not a staff for executive administration, but one for dealing with all naval problems from the point of view of right theory and scientific practice—then a result would be produced far greater and more valuable than can be got by any mere provision of inert and costly things. It is, after all, on the men, and not on the ships, that you rely. See that they have the ships — guns — methods — plans—preparations—training, *that they ask for.*

Arthur H. Pollen.